Linking human activities to eutrophication along the river-ocean continuum with an ecological model

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About 15 years ago, the joint expertise of RBINS and ULB led to the coupling of a hydrodynamic model (COHERENS; Luyten *et al.*, 1999) with an ecological model (MIRO; Lancelot *et al.*, 2005). MIRO is able to simulate the annual cycle of carbon, inorganic (NH4, NO3, PO4, SiO2) and organic nutrients, phytoplankton (diatoms, nanoflagellates, *Phaeocystis*), bacteria and zooplankton (microzooplankton, copepods). The coupled model has been set up to cover the Southern North Sea and the English Channel (Lacroix *et al.*, 2007). It has already proven its usefulness, for instance, in eutrophication related studies (Lenhart *et al.* 2010) or to assess the biotic and abiotic control of $C0_2$ fluxes in coastal waters (Gypens *et al.*, 2011).

Very recently, MIRO&CO has been upgraded to its second version (MIRO&CO V2). The code has been completely rewritten in FORTRAN 90 and new features were made available. Oxygen is now explicitly included as a model state variable and a tracer method is currently being implemented into the model. Realistic weather and river forcing are used to force the model. Nutrients input are done via the main rivers, ocean open boundaries and atmospheric wet and dry depositions.

The new implementation of the marine ecological model will be presented. The model potential in terms of providing relevant information to marine scientific and management issues will be discussed. This will be illustrated with the help of model results.

References

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